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ABSTRACT

Focusing on masonry, this module is one of eight included in the Vocational Education Readiness Tests (VERT). The module begins by listing the objectives of the module and describing tools and equipment needed. The remainder of the module contains sections on manipulative skills, trade vocabulary, tool identification, trade computational skills, and measuring skills depicted as minimum competencies students should possess prior to entrance into regular secondary vocational education programs. (A user's guide is also available--see note.) (LRA)

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Module 5 of the Vocational Education Readiness Test (VERT)

MASONRY

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MASONRY

Objective(s):

1. To determine student's ability to measure in inches, half-inches, quarter-inches, and eighth-inches.
2. To determine student's ability to move and stack 49 common brick.
3. To determine student's ability to spread and furrow mortar with a masonry trowel.
4. To determine student's ability to lay a dry wall of brick on a straight line and plumb, with ⅜" open joints.
5. To determine student's ability to lay dry courses of brick in corner construction.
6. To determine student's ability to lay paving brick.
7. To determine student's ability to move and stack 8" concrete blocks.
8. To determine student's ability to lay a dry wall of 8" concrete blocks with open joints on a straight line.

Tools Needed:

Approximately 60 whole common bricks (furnished locally)

Sand and slacked lime (furnished locally). (Approximately three sand to one slacked lime with adequate water)

Masonry trowel

One 2" × 4" stud 8' long (Furnished locally)

Mortar board (32" × 32")

⅜" spacer (plywood strip ⅜" × 2" × 6")

Brick tongs (adjusted for seven bricks)

24" magnesium spirit level

White or blue chalk

Twelve 8" × 8" × 16" concrete blocks

Two 20" × 40" pieces of plywood (½") for brick and block bases.

One wood pallet (28" × 64" × 4") premarked by evaluator for brick wall and corner and block wall (Use 2" × 4" frame and ⅝" exterior plywood)

12" plastic ruler

Note: See Appendix A for masonry platform specifications.

Preliminary Exercise:

The evaluator will identify a 12" plastic rule and demonstrate how to measure to the nearest inch, half-inch, quarter-inch, and eighth-inch. Answer any questions at this time; however, avoid *"teaching"* the student to measure by giving repeated demonstrations. (See Figure 1.)

Special Instructions: Lines for Tasks 1 - 4 should measure 3", 3 1/2", 3 1/4", and 3 1/8", respectively, and should be drawn on a separate sheet of paper.

Figure 1.

Task 1: _____*

Task 2: _____*

Task 3: _____*

Task 4: _____*

Tasks 1 through 4

Given a 12" plastic rule and measuring tasks 1, 2, 3, and 4, the student will measure the line in each task and tell his/her findings to the evaluator.

*Lines are drawn on separate sheet to respective length by evaluator.

Preliminary Exercise:

The evaluator will identify a stack of 49 common bricks and demonstrate the correct method of carrying bricks using brick tongs (brick tongs set for seven bricks). (See Figure 2.)

Special Instructions: *Evaluator sould measure a distance of 12', place a marker at that point, and have student carry bricks (from side #1 of the brick base) around the marker and place them back on the plywood base, side #2.*

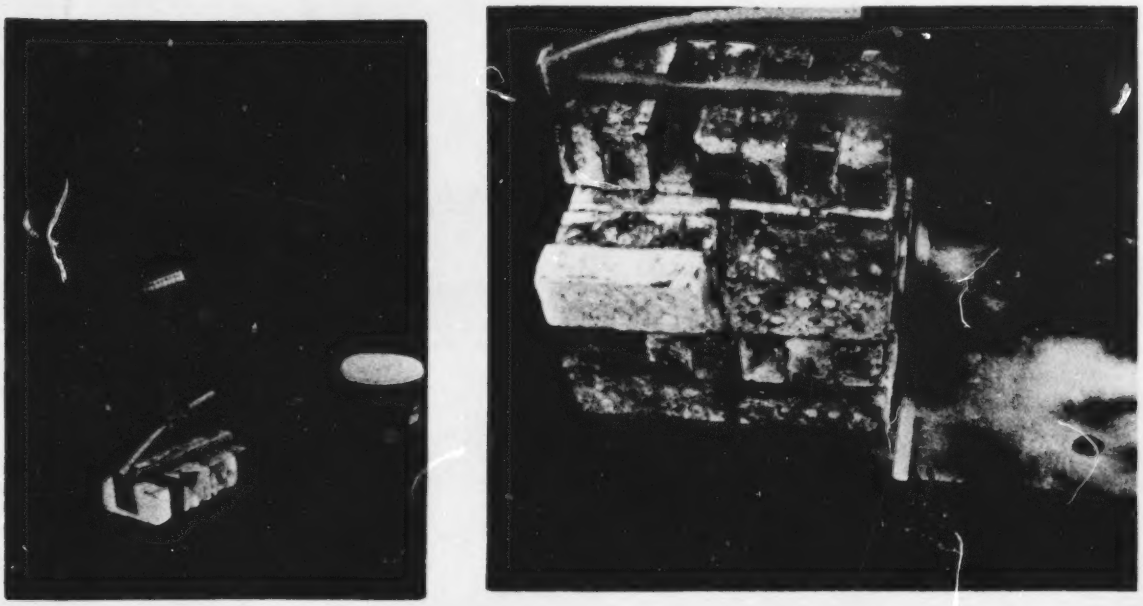


Figure 2.

Task 5

Given a stack of 49 bricks sitting on side #1 of the brick base and brick tongs (adjusted to carry seven bricks), the student will move the bricks (seven at a time) a distance of 25' around the marked pathway and restack them on side #2 of the brick base. **Note time!**

Preliminary Exercise:

The evaluator will identify the masonry trowel and demonstrate the correct procedure for spreading and furrowing mortar on a 2" × 4" stud 8' long. **(This is the only task requiring the use of mortar!)** (See Figure 3.)

Special Instructions: Evaluator should mark the stud 1' from each end so that the student will spread and furrow mortar a distance of 6'. Stud should be approximately 6" above ground.

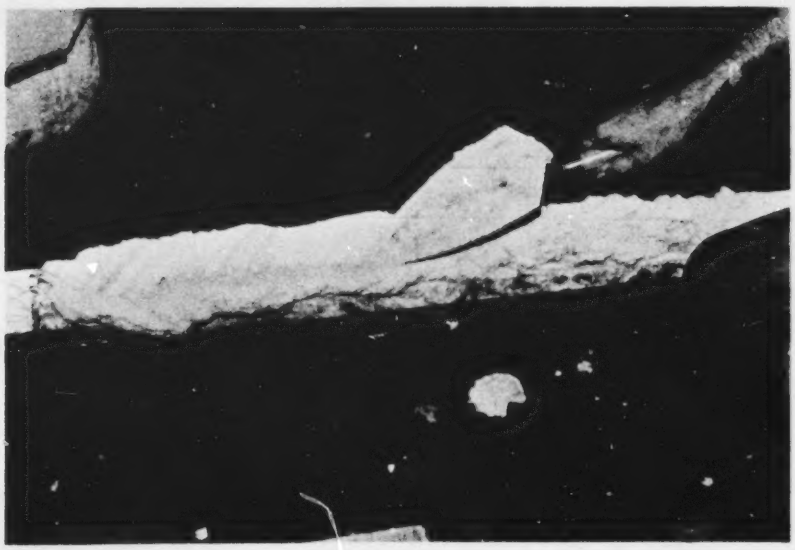


Figure 3.

Task 6

Given a masonry trowel, mortar board, prepared mortar, and a premarked 2" × 4" stud, the student will lay and furrow a 6' bed of mortar on the stud. **Note time!**

Preliminary Exercise:

The evaluator will demonstrate how to construct and plumb a five course brick wall (without mortar) approximately 3' in length with ⅜" joints. (See Figure 4.)

Special Instructions: The dimensions for this wall should be premarked on the pallet. Bricks should be within 4' of the plywood pallet.

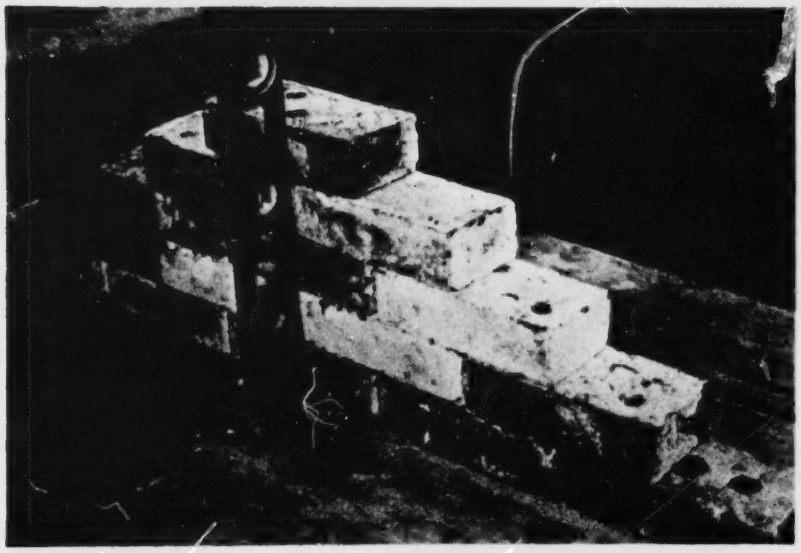


Figure 4.

Task 7

Given approximately 15 bricks, a ⅜" plywood joint spacer, a pallet with length of wall premarked, and a 24" spirit level, the student will construct and plumb a single dry wall five courses high, 3' long with ⅜" joints. **Note time!**

Preliminary Exercise:

The evaluator, using ⅜" plywood joint spacer, brick pallet, and a spirit level, will demonstrate how to lay a single dry brick corner wall seven courses high. (See Figure 5.)

Special Instructions: *Brick corner should be marked on the pallet by evaluator —28" × 32". Bricks should be placed approximately 4' from the pallet.*

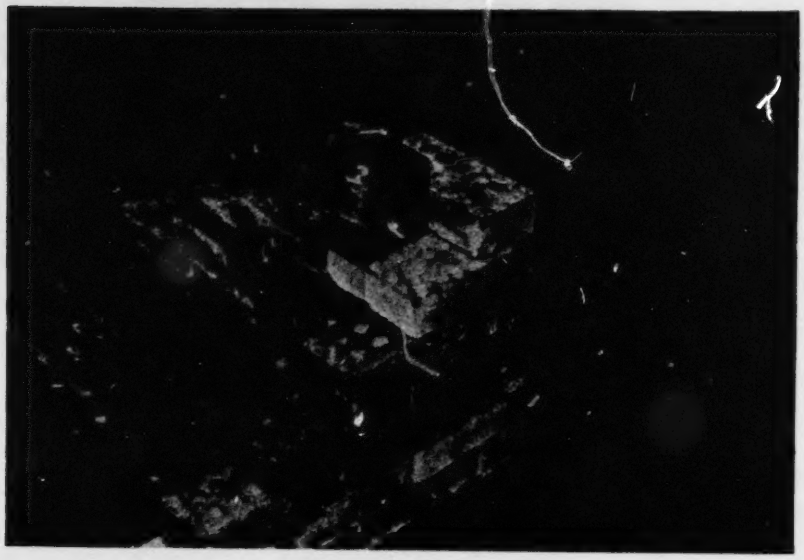


Figure 5.

Task 8

Given 28 common bricks, a 26" × 64" premarked pallet, ⅜" plywood joint spacer, and a spirit level, the student will construct and plumb a dry corner wall seven courses high. **Note time!**

Preliminary Exercise:

The evaluator will demonstrate how to lay a basket weave paving design on the mortar board. (See Figure 6.)

Special Instructions: Use mortar board for paving base (32" × 32"). Use ⅜" scrap plywood for spacing tool. Bricks should be stacked approximately 4' from the pallet.

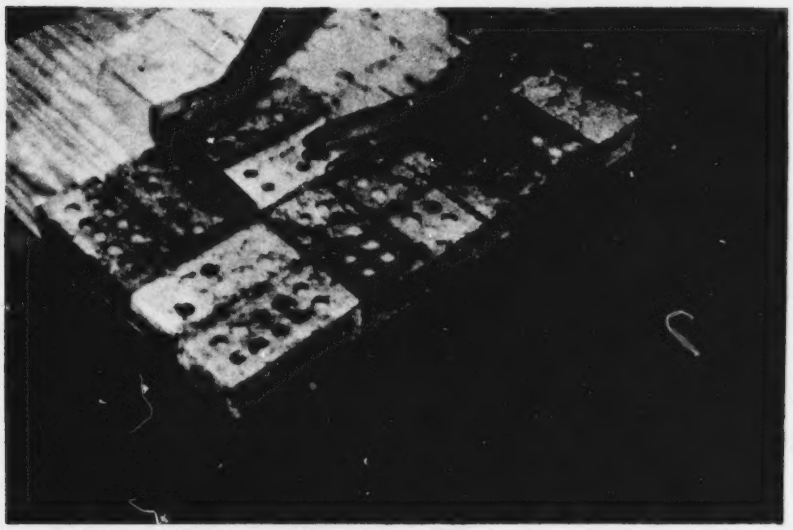


Figure 6.

Task 9

Given 32 common bricks, a 32" × 32" mortar board and ⅜" plywood spacer, the student will pave an area 32" × 32" using the basket weave paving design. **Note time!**

Preliminary Exercise:

The evaluator will identify a stack of 12 concrete blocks (8" × 8" × 16") and demonstrate the correct method of carrying blocks by hand. (See Figure 7.)

Special Instructions: Have the student carry two blocks at a time from side #1 of the plywood block base, around the path and return and stack them on side #2 of the plywood base.

Figure 7.

Task 10

Given a stack of 12 concrete blocks (8" × 8" × 16"), the student will move the blocks (from side #1 of the plywood base), two at a time, and carry them around the pathway a distance of 25' and restack them on side #2 of the plywood base. **Note time!**

Preliminary Exercise:

The evaluator will demonstrate how to construct and plumb a four course (8" × 8" × 16") concrete block wall (without mortar) approximately 5' in length (10 blocks required). (See Figure 8.)

Special Instructions: *Use premarked 28" × 64" pallet as base for this task. Blocks should be stacked approximately 4' from the pallet.*

Figure 8.

Task 11

Given approximately 10 concrete blocks (8" × 8" × 16"), a premarked pallet, and a spirit level, the student will construct and plumb a single dry wall of concrete blocks four courses high and approximately 5' in length. **Note time!**

VOCATIONAL EDUCATION READINESS TEST (VERT)
SCORING RESULTS SHEET FOR MASONRY

(Example Only)

Name _____

Student Performance Data

	Time*				
	Acceptable	Unacceptable	**Cut-Off Time (Seconds)		
Task 1	_____	_____	(1/2")	X	Measurement Skills
Task 2	_____	_____	(1/4")	X	
Task 3	_____	_____	(1/8")	X	
Task 4	_____	_____	(1/16")	X	
Task 5	_____	_____	95		
Task 6	_____	_____	50		
Task 7	_____	_____	110		
Task 8	_____	_____	185		
Task 9	_____	_____	240		
Task 10	_____	_____	115		
Task 11	_____	_____	140		

*Write N/C should student be unable to complete the task.
**These scores were arbitrarily identified and included for demonstration purposes only.

Masonry Vocabulary

ABSORBENT: Refers to material being able to take up moisture.

ADOBE BRICK: Large sun-dried bricks of different sizes.

AIR SPACE: An empty space in a wall between the bricks.

ANCHOR: Metal pieces used to attach bricks to a wall, etc.

ARCH: Brick laid in a curved manner over the opening of a window, door, etc.

BASEMENT: The lower part of a house or building, usually below the ground.

BAT: A piece of brick.

BEAM: A piece of timber, iron, etc. used to support heavy weight over an opening.

BEARING WALL: A wall which supports a load other than its own weight.

BOND: The tying together of a masonry wall by use of mortar, metal ties, etc.

BRICK: A building material made of clay, shale, etc. which is molded into standard sizes and fired or burned in a kiln.

BRICK VENEER: The outside wall of brickwork covering a building.

BUTTERING: Placing mortar on a brick with a trowel.

CEMENT: A burned mixture of crushed clay and limestone for making mortar or concrete.

CLINKER: A hard burned brick.

CLOSER: The last brick or stone laid in a course.

CODE (BUILDING): A set of laws, regulations, etc. which specify the quality of materials, location and workmanship in the construction of buildings.

CONCRETE: A mixture of portland cement, aggregates, and water.

CORNER BLOCK: A concrete block used in constructing the end or corner of a wall.

COURSE: A continuous level line of bricks bonded with mortar.

CULLING: Sorting bricks into stacks by size, color, quality, etc.

CULLS: Bricks unfit for building walls, etc.

CURTAIN WALL A brick wall which does not support a load-usually built to enclose a frame building.

EXPANSION JOINT: A joint or space to allow for expansion due to temperature changes.

EXTERIOR WALL: The outside wall of a building.

FACE: The surface of a brick or the part which can be seen.

FIRE BRICK: Brick made of ceramic materials, etc. to resist high temperatures.

FIRE CLAY: A clay that can stand a lot of heat without burning.

FIRE WALL: Brickwork in the walls between buildings, rooms, etc. to prevent the spread of fire. A fire wall usually extends through and above the roof of a building.

FLASHING: Metal or waterproof fabrics placed around mortar joints to stop water--metal flashing is commonly used when fireplace chimneys extend above a roof.

FLOAT: A flat, broad wood or metal hand tool for leveling concrete.

FLOATING CONCRETE: Leveling fresh concrete with a float.

FLUE: An opening up a chimney for the passage of smoke and gases.

FLUE LINING: A hollow tile for lining flues to help prevent house fires.

FOOTING: The foundation for a brick or other type wall.

GLAZED TILE: Tile that is glasslike on its surface.

HEARTH: The part of a fireplace upon which the fire is built.

JOINTER: A tool used for smoothing fresh mortar in mortar joints.

LAP: The distance one brick extends over another.

LIME: Produced by burning limestone in a kiln until carbon dioxide has been driven off.

LINEAR FOOT: A foot measurement along a straight line.

MANTEL: A shelf above a fireplace opening.

MASON: A worker skilled in working with bricks, blocks, stone, etc.

MORTAR BOARD: A board approximately 3 feet square for holding mortar ready for use.

MORTAR BOX: A box in which mortar is mixed and readied before it is placed on a mortar board.

PAVING: Forming a floor with stones or bricks.

PERFORATED WALL: A wall which contains a large number of small openings.

PLASTIC: Something in the form of a sticky paste.

PLUMB BOB: A lead weight used to make a plumb line tight.

POINTING: Troweling mortar into a joint after bricks have been laid.

PORTLAND CEMENT: A cement made by burning and grinding a mixture of lime, silica, alumnia, and iron oxide.

REINFORCED CONCRETE: Concrete which has iron or steel rods placed in it to help it withstand heavy loads, etc.

SAG: A line or course of bricks with a dip in it -- not level with the bricklayer's stretched line.

SAND: Small bits of quartz, rocks, etc.

SCAFFOLD: A platform from which brickmasons work.

SCREEDING: Leveling a concrete surface with a straightedge.

SET: Concrete, mortar, etc. changing from a plastic to a solid state.

SPAN: The distance over an open area to be covered by a beam, arch, girder, etc.

STRIKE-OFF: Removing all extra concrete from within the concrete forms.

STRUCK JOINT: Any mortar joint which has been finished by a trowel.

SUPERSTRUCTURE: Any part of a building which is above ground.

TEMPER: To mix the mortar properly to a stage where it is ready for instant use.

TENDER: A person who tends to the needs of masons -- a hod carrier, wheelbarrow handler, etc.

TERMITE SHIELD: A metal shield placed in masonry work to stop termites from entering a building.

TROWEL: A flat, broad-bladed hand tool for applying mortar to bricks and stone,.

WASHING DOWN: Cleaning the surface of brick walls with a mild acid solution.

WEATHERING: Decay caused by the effects of weather.

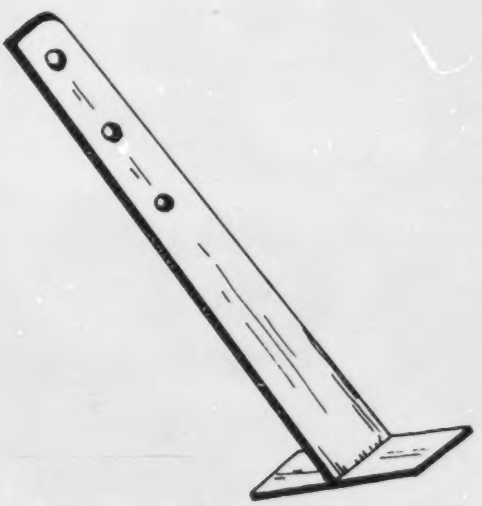
WEEP HOLES: Openings in mortar joints to allow moisture to escape.

Tools for Masonry

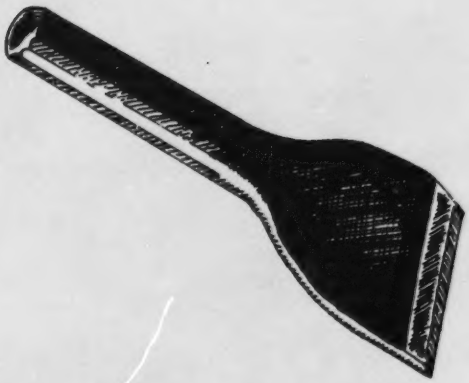
POINTING TROWEL

BRICK TROWEL

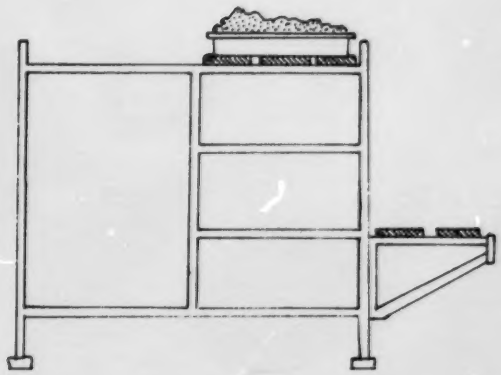
SPIRIT LEVEL



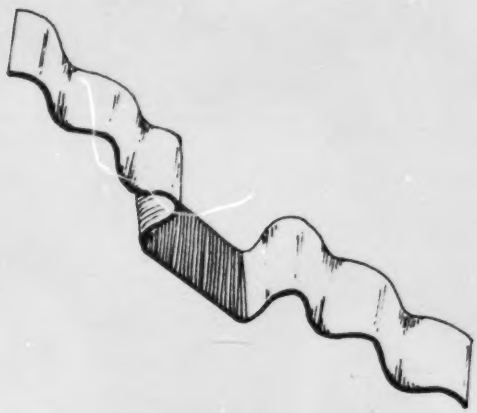
BRICK ANCHOR



BRICK CHISEL



METAL SCAFFOLD



CORRUGATED METAL TIE

WATER BUCKET

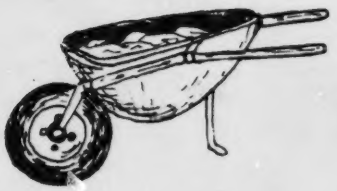
SHOVEL

BUTTERING TROWEL

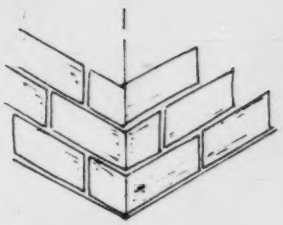
MASONRY HAMMER

T-ANGLE

BRUSH



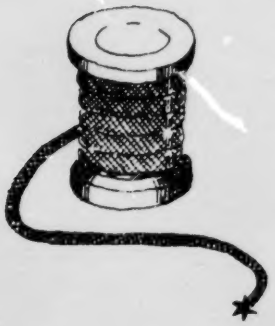
WHEELBARROW



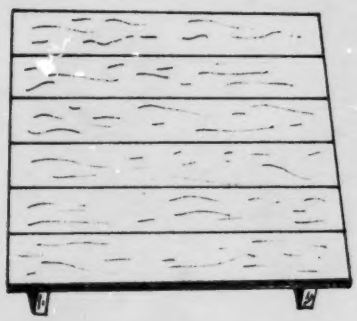
CORNER BLOCKS

MASONRY HOE

JOINTING TOOL

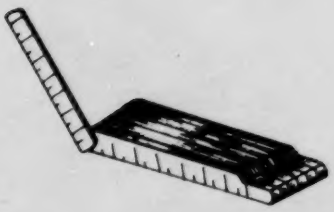


CHALK LINE

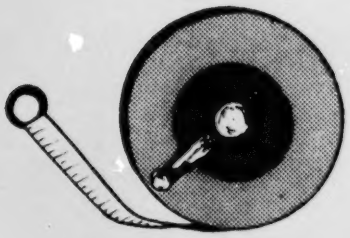


MORTAR BOARD

STRING FOR TAUT LINE



6 FT. FOLDING RULE



REWIND
MEASURING TAPE

COMPUTATIONAL SKILLS
FOR
Masonry

Addition:

1 1/3 +2 2/3	2 3/4 3 1/2	4 7/8 6 7/8	5 1/2 6 1/4	3 1/2 9 1/2	19 7/16 17 3/16	46 1/8 55 3/8

						56
123	2,320	12.88	1.67	.06	.92	43
56	199	11.22	.09	.07	.09	7
						19

132		
88	1/2	11 5/16
11	3/4	6 1/4
121	1/3	3 3/8

Subtraction:

18 -7	10.3 6.8	11 1/2 3 1/4	8 3/8 4 5/8	22 3/4 6 1/2	13 11/16 2 3/16

1/67	.92	23.04	16.50	112.62	110.17
.09	.09	3.97	8.51	99.73	109.79

Multiplication:

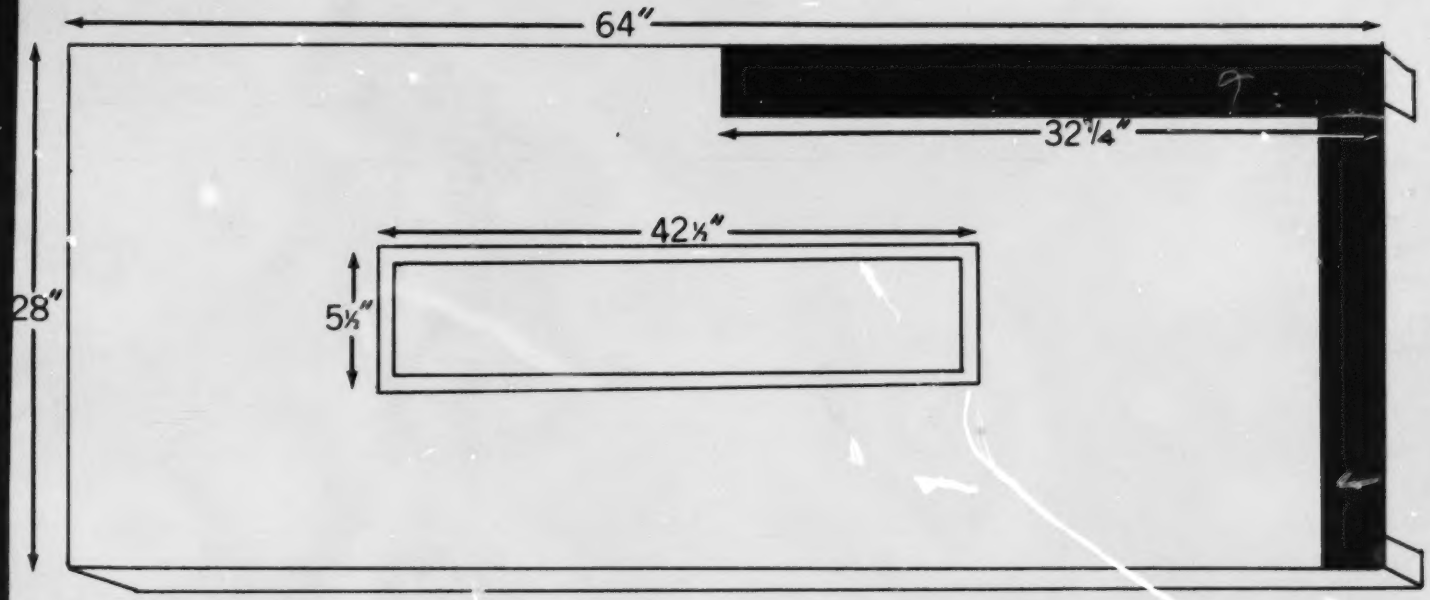
15 × 3=	2.3 ×6.8 =	1/4 × 1/2 =
22 × 22=	9.9 × 13.4 =	8 × 9.5 =
11 × 110 =	11.5 × 16 =	12 × 11 =

Division:

4 ÷ 2 =	129.6 ÷ 10 =	25.5 ÷ 5 =
16 ÷ 2 =	44 ÷ 12 =	25.5 ÷ 15 =
36 ÷ 6 =	116 ÷ 36 =	1080 ÷ 33 =

Reading Problems

1. Building bricks weigh 5 pounds each. Your brick trailer has a load limit of 8,000 pounds. Will the trailer carry 1200 bricks?
2. There are 7 bricks per sq. foot of wall surface. You plan to brick a wall measuring 8' × 30'. How many bricks should you order?
3. Building bricks cost $100 per 1,000 bricks. How much would 3,000 bricks cost?
4. You are working for $4.00 per hour as a mason's helper. You worked 5 hours Monday, 7½ hours Tuesday, and 6 hours Wednesday. How much should you earn?
5. You worked 56 hours last week. The pay scale was $4.00 per hour for 40 hours and $6.00 an hour for all time over 40 hours. How much money did you earn?
6. A single mix of mortar is 1 measure of cement and 3 measures of sand. How many measures of cement and sand would it take to make a triple mix of mortar?
7. You estimated that a small masonry job would take 1,000 bricks at $80.00 per thousand, $25.00 in sand and cement, and 8 hours of your time at $10.00 per hour. The customer offers you $175.00 to do the job. Should you take it? Why?



MASONRY PLATFORM
(Base construction of 2 x 4 frame)

Appendix A